



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/616,162	07/09/2003	Jianying Li	131214	9757

7590 12/11/2007
Patrick W. Rasche
Armstrong Teasdale LLP
Suite 2600
One Metropolitan Square
St. Louis, MO 63102

EXAMINER

CHU, RANDOLPH I

ART UNIT	PAPER NUMBER
----------	--------------

2624

MAIL DATE	DELIVERY MODE
-----------	---------------

12/11/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/616,162	Applicant(s) LI, JIANYING	
	Examiner Randolph Chu	Art Unit 2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10/17/2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-24 and 26 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-8, 10-18, 21-24 and 26 is/are rejected.
- 7) ☒ Claim(s) 9 and 19 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claim (s) 1-4, 10-14 and 20-24 are rejected under 35 USC 103(a) as being unpatentable over Kato et al. (US Patent 4,317,179) in view of Loce et al. (US 5,696,845).

With respect to claim 1, Kato et al. teaches, obtaining an image (abstract, radiography image); and obtaining a final pixel value by performing a filtering operation on an initial pixel value of at least one pixel of the image and by modulating the filtering operation with a gain factor that is based on gain factor curve (Fig. 3) and a relative pixel value (abstract, col. 3 line 64- col. 4 line 2, col. lines 8-13).

Kato et al does not teach a relative pixel value calculated based on a threshold value T.

Loce et al. teaches a relative pixel (output pixel) value which is associated with a threshold (col. 12 lines 19-65).

At the time of the invention it would have been obvious to a person of ordinary skill in the art to use relative pixel value based on a threshold in the method of Kato et al.

The suggestion/motivation for doing so would have been that threshold value used to achieve filter that have same input/output density relationship.

Therefore, it would have been obvious to combine Loce et al. with Kato et al. to obtain the invention as specified in claim 1.

With respect to claim 2, Kato et al. teaches, obtaining the final pixel value comprises obtaining the final pixel value by using $P_f(i,j) = P(i,j) - (P(i,j) - \text{decon}(P(i,j))) * \text{Gain}(i,j)$, wherein $P(i,j)$ (D_{org}) the initial pixel value, $\text{decon}(P(i,j))$ (D_{us}) is a deconvolution operation performed on the initial pixel value, $\text{Gain}(i,j)$ (β) is the gain factor of the pixel, and (i,j) is the pixel (abstract, col. 3 line 64- col. 4 line 2, col. lines 8-13).

With respect to claim 3, Kato et al. teaches, categorizing the image into at least two regions of low, medium, and high density (col. 11 lines 13-41).

With respect to claim 4, Kato et al. teaches modulating the filtering operation comprises: performing a smoothing operation on one of the regions; and limiting the smoothing operation to the region (col. 3 lines 40-63).

With respect to claim 5, Loce et al. teaches determining the threshold value base on a predetermined value (col. 12 lines 19-65).

With respect to claim 6, Kato et al. teaches generating gain factor curve as a function of the relative pixel value of each pixel of the image (col. 12 line 19 – col. 13 line 5).

With respect to claim 10, please refer to rejection for claim 1.

With respect to claim 11, please refer to rejection for claim 1.

With respect to claim 12, please refer to rejection for claim 2.

With respect to claim 13, please refer to rejection for claim 3.

With respect to claim 14, please refer to rejection for claim 4.

With respect to claim 15, please refer to rejection for claim 5.

With respect to claim 16, please refer to rejection for claim 6.

With respect to claim 20, please refer to rejection for claim 1.

With respect to claim 21, please refer to rejection for claim 1.

With respect to claim 22, please refer to rejection for claim 2.

With respect to claim 23, please refer to rejection for claim 3.

With respect to claim 24, please refer to rejection for claim 4.

With respect to claim 25, please refer to rejection for claim 5.

3. Claim 7, 8, 17 and 18 are rejected under 35 USC 103(a) as being unpatentable over Kato et al. (US Patent 4,317,179) in view of Loce et al. (US 5,696,845) and in further view of Nakamura et al. (US Patent 5,649,031).

With respect to claim 7, Kato et al. in view of Loce et al. teaches all the limitations of claim 6 as applied above from which claim 7 respectively depend.

Kato et al. in view of Loce et al. does not disclose calculating an effective pixel value from the initial pixel value by using $(P_e(i,j) = (P(i,j) + P(i-1,j) + P(i+1,j) + P(i,j-1) + P(i,j+1)) / 5)$, wherein $P_e(i,j)$ is the effective pixel value, and $P(i-1, j)$, $P(i+1, j)$, $P(i, j-1)$, and $P(i, j+1)$ are pixel values of pixels that are adjoining the pixel with pixel value $P(i, j)$.

Nakamura et al. teaches calculating an effective pixel value from the initial pixel value by using $(P_e(i,j) = (P(i,j) + P(i-1,j) + P(i+1,j) + P(i,j-1) + P(i,j+1)) / 5)$, wherein $P_e(i,j)$ is the effective pixel value, and $P(i-1, j)$, $P(i+1, j)$, $P(i, j-1)$, and $P(i, j+1)$ are pixel values of pixels that are adjoining the pixel with pixel value $P(i, j)$. (Fig. 3B, col. 3 line 64-col.4 line 19, $A(h) = (c+g+h+l+m)/5$).

At the time of the invention it would have been obvious to a person of ordinary skill in the art to use $P_e(i,j) = (P(i,j) + P(i-1,j) + P(i+1,j) + P(i,j-1) + P(i,j+1)) / 5$ to determine effective pixel value in the method of Kato et al.

The suggestion/motivation for doing so would have been that even weighted average of neighbor pixel to blur the image.

Therefore, it would have been obvious to combine Nakamura et al. with Loce et al. and Kato et al. to obtain the invention as specified in claim 7.

With respect to claim 8, Ahmed et al. teaches calculating the relative pixel value $P_r(i,j)$ from the effective pixel value by using $P_r(i,j)=P_e(i,j)/T$ (col. 10 lines 13-28).

With respect to claim 17, please refer to rejection for claim 7.

With respect to claim 18, please refer to rejection for claim 8.

4. Claim 26 is rejected under 35 USC 103(a) as being unpatentable over Kato et al. (US Patent 4,317,179) in view of Loce et al. (US 5,696,845) and in further view of Argiro et al. (US 2007/0036417).

With respect to claim 7, Kato et al. in view of Loce et al. teaches all the limitations of claim 21 as applied above from which claim 26 respectively depend.

Kato et al. in view of Loce et al. does not disclose determining the initial pixel value and the relative pixel value based on a Hounsfield number.

Argiro et al. teaches determining the initial pixel value and the relative pixel value based on a Hounsfield number (para [0052]).

At the time of the invention it would have been obvious to a person of ordinary skill in the art to use Hounsfield number to determine initial pixel value in the method of Kato et al.

The suggestion/motivation for doing so would have been that to use standards that chosen as they are universally available references and suited to the key application for which computed axial tomography.

Therefore, it would have been obvious to combine Argiro et al. with Loce et al. and Kato et al. to obtain the invention as specified in claim 26.

Allowable Subject Matter

5. Claims 9 and 19 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is an examiner's statement of reasons for allowance: claim 9 and 19 are allowable over the prior art of record because non of the prior art of record teaches the combined claimed elements as set forth in the claims 9 and 19.

None of the prior art of record teaches or fairly suggests that image processing method for filtering using gain factor of

$$Gain(i, j) = -0.35 + 0.1 * P_r(i, j) + 0.15 * P_r(i, j)^2 + 0.2 * P_r(i, j)^3 + 0.4 * P_r(i, j)^4 + 0.5 * P_r(i, j)^5,$$

and together with combination of other claimed elements as set forth in the independent claims 9 and 19. Therefore, the claims 9 and 19 are over the prior art of records.

Response to Amendment

In response to applicant's amendment received on 8/16/2007, all requested changes to the claims have been entered.

Response to Argument

Applicant's arguments filed on November 8/16/2007, have been fully considered but they are not persuasive.

Applicant's argue on page 7 of the response that the disclosure of Kato does not describe or suggest obtaining a final pixel value by performing a filtering operation on an initial pixel value of at least one pixel of an image and by modulating the filtering operation with a gain factor that is based on a gain factor curve and a relative pixel value. And Applicant's argue that Kato describes a modulation transfer function that is based on the difference between an original image density and an unsharp mask density and on an emphasis coefficient.

The examiner disagrees. transfer function of Kato can be interpreted as filtering operation and an emphasis coefficient can be interpreted as gain factor.

Other arguments have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Randolph Chu whose telephone number is 571-270-1145. The examiner can normally be reached on Monday to Thursday from 7:30 am - 5 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, ^{Matt Bella} ~~Joseph Mancuso~~ can be reached on 571-272-⁷⁷⁷⁸ ~~76957695~~. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

RIC/



MATTHEW C. BELLA
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600